



BUSINESS PERSPECTIVES



LLC "CPC "Business Perspectives"  
Hryhorii Skovoroda lane, 10, Sumy,  
40022, Ukraine

[www.businessperspectives.org](http://www.businessperspectives.org)

**Received on:** 24<sup>th</sup> of December, 2018

**Accepted on:** 12<sup>th</sup> of February, 2019

© Nguyễn Thị Nhung, Trần Thị Vân Anh, 2019

Nguyễn Thị Nhung, Doctor, Lecturer at the Faculty of Finance and Banking, University of Economics and Business (UEB), Vietnam National University (VNU), Vietnam.

Trần Thị Vân Anh, Doctor, Lecturer at the Faculty of Finance and Banking, University of Economics and Business (UEB), Vietnam National University (VNU), Vietnam.



This is an Open Access article, distributed under the terms of the [Creative Commons Attribution 4.0 International license](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted re-use, distribution, and reproduction in any medium, provided the original work is properly cited.

Nguyễn Thị Nhung (Vietnam), Trần Thị Vân Anh (Vietnam)

# HAS MERGER AND ACQUISITION BEEN CONSIDERED AS A METHOD OF DEALING WITH WEAK BANKS? EVIDENCE FROM THE THIRD BANK RESTRUCTURING PROCESS IN VIETNAM

## Abstract

In the third bank restructuring process in Vietnam during the 2011–2016 period, banking system experienced the participation of 14 commercial banks with 7 successful, both mandatory and voluntary, M&A deals. This research tries to answer if M&A was a good method of dealing with weak banks as Vietnam expected. Firstly, the article evaluates M&A activities' effects on business results of acquiring banks through three financial ratios (including return on asset (ROA), return on equity (ROE) and net interest margin (NIM) by using paired sample T-Test. The results show that M&A activities only have positive effects on ROA of acquiring banks in Vietnam, while impacts of M&A activities on ROE and NIM are not clear. Secondly, by using a fuzzy TOPSIS approach based on Balanced Scorecard, the research shows that the performance of acquiring banks in mandatory M&A deals are not good as compared to the other acquiring banks. In fact, M&A deal only has strongly positive effects on acquiring bank performance, when it is totally based on real demands of both target and acquiring banks as well as created synergy. Therefore, to deal with weak banks in the next time period, Vietnamese banking system should focus on other market solutions in addition to keeping the nature of M&A activities and improving its efficiency.

## Keywords

Merger and Acquisition (M&A), bank restructuring process in Vietnam, financial performance in a bank, performance in a bank, fuzzy TOPSIS

**JEL Classification** G34, G21

## INTRODUCTION

In 2011, the Vietnamese banking system had 52 commercial banks, 51 branches of foreign banks, 31 non-bank credit institutions and a few credit funds. All financial institutions faced many difficulties, while the global economy had not been recovered yet after the financial crisis. There had been negative influences from the public debt crisis of European countries. The domestic capital market was still unstable. Moreover, the internal system of credit institutions in Vietnam still had many inadequacies, hence it would be better to consolidate and strengthen them. Therefore, on March 1, 2012, the Prime Minister approved the Project No. 254, the objective of which was to focus on stabilizing the banking system, maintaining healthy financial status of financial institutions and ensuring the ability to handle various problems such as cross-ownership status or bad debt of banking system, especially dealing with weak commercial banks in Vietnam. The State Bank of Vietnam encouraged the financial institutions to voluntarily contact to each other for the acquisition, merger and consolidation based on the rules of ensuring the legitimate rights and interests of the involved parties.

During the period from 2011 to 2016, the banking system of Vietnam recorded 7 successful M&A deals, which saw the participation of 14 commercial banks and contributed to reduction of 7 commercial banks in Vietnam (Appendices A and B). Among them, only two deals between Sacombank and Southern Bank, as well as between HDBank and DaiABank were voluntary. The other five were mandatory because of the weakness of banks. After mergers, it was obviously seen that acquiring banks experience an increase in charter capital, total assets, profit after tax, business networking, clients, employees, etc. (Appendix C).

So far, the M&A process in commercial banks in Vietnam has gone through phase 1 and is entering to phase 2 (2016–2020). This is the perfect time to systematically evaluate the first phase of M&A activities by summarizing the achieved results and pointing out the limitations and causes. The article will focus on seven successful M&A deals among Vietnamese commercial banks over the past six years from 2011 to 2016, and try to answer two questions, such as:

- 1) Do M&A activities have positive impacts on business results of acquiring banks?
- 2) Are the mandatory M&A deals for weak banks really efficient in terms of performance?

To our knowledge, this is the first paper that assesses the effectiveness of M&A activities in the 3rd bank restructuring process in Vietnam, in terms of dealing with weak banks. The findings of the paper will contribute to the literature review on roles and impacts of M&A on bank activities in emerging countries like Vietnam. Moreover, the research will provide empirical findings related to the depth of M&A deals in Vietnam during the previous time. These are also the basis for proposing more appropriate solutions for dealing with weak banks in the next time period.

Beside Introduction, the second section will review literature on M&A activities and their impacts on acquiring banks' value, profitability and performance. Methodology and data used to evaluate impacts of M&A on business results of acquiring banks, as well as to find out the best acquiring banks in terms of performance will be presented in the third section. Findings will be shown in section 4. The last section will provide some conclusions.

---

## 1. IMPACTS OF M&A ON BANK ACTIVITIES

Globalization, advances in information technology and financial crises in the last two decades have changed banking in many countries profoundly and forced the national banking authorities to de-regulate and restructure domestic banking industries. In this situation, M&A is considered as an effective tool in many countries and the outcomes of M&A are the main topic of academic studies around the world.

### 1.1. M&A activities and restructuring process in banking sector

M&A has an effect on the whole process of reconstructing banking system in many countries. Hernández et al. (2015) analyzed the performance

of 51 financial institutions over the period of 2008–2012 as the time when the Spanish financial system was conducting a restructuring process. The empirical results showed that if the transition from a saving bank to a bank was based on reasonable and strictly controlled principles, it would increase the solvency as well as the value of a newly established bank. Although at the time the authors conducted their research it was still early to evaluate M&A results comprehensively, but the initial results showed that M&A had a positive impact on the Spanish financial system. In the case of OECD countries, Focarelli et al. (2001) collected data on 2,500 banks from 29 OECD countries to evaluate the impact of the cross-border M&A on the efficiency and profitability of those banks. A two-way causation between banking sector development and cross-border M&As was found by Elikplimi et al. (2012) using data of 11 African countries for

the period from 1993 to 2008. Both studies show a positive impact of M&A on the banking system.

There are studies that have different results on the impact of M&A on the banking system of some countries in the world. This may be due to differences in size, strength and structure of banks as well as in the way financial systems are managed in those countries (Hernández et al., 2015). For example, Rezitis (2008) showed that M&A had negative effects on technical efficiency and total factor productivity growth of Greek banks. The research of Focarelli et al. (2002) did not show any increase in profitability after M&As in the Italian banking system during the period from 1985 to 1996. The cause of this phenomenon was explained by the authors as follows: although M&A had increased income from services, it had also increased other costs such as expenses for employees. However, other studies such as Baera and Nazmi (2000) on restructuring banks in Brazil, Yildirim and Philippatos (2007) on Latin American banking systems, Jagtiani (2008) on US community banks or Poshakwal and Qian (2011) on banks in Egypt showed that the efficiency and solvency of the banking system had been significantly increased after the restructuring process. Even in Germany where there were still many conflicting views on the impacts of M&As on the entire banking system, in general all M&As done in Germany were considered successful and, therefore, improved the performance of related financial institutions (Koetler, 2005). Although bank restructuring was a costly and time-consuming process, however, if larger banks that were able to absorb higher losses and could strengthen monitoring for smaller banks as well as accurately identify the problems of those small banks, it was possible to reduce the cost of bank reconstruction (Iwanicz-Drozdowska et al., 2016). In short, many studies about M&A impacts on the banking system show that M&A can be considered as one of the effective tools to support the banking industry restructuring process in many countries.

## 1.2. M&A activities and value of the acquiring banks

The M&A also has a strong influence on the value of the banks. Scholtens and de Wit (2004) analyzed 61 targets and bidders in the US

market and 17 targets and 20 bidders in the European market for the period from 1990 to 2000. They indicated that bank mergers in Europe and America might lead to very different results in terms of shareholder value. If in European banking market both targets and bidders received positive cumulative abnormal returns, then in the case of American banks only targets got positive returns, bidders even had negative returns (Scholtens & de Wit, 2004). They also noted that their empirical results were quite similar to those of DeLong (2003).

While evaluating the effect of M&A, Rad and Beek (1999) showed that target shareholders had high positive returns, while returns to bidder's shareholders were not high. They also found out that returns to acquiring bank shareholders were more positive when the bidder was larger and more efficient. To assess the profitability of shareholders through M&A, DeLong (2001) examined the bank mergers dividing them into four groups depending upon operations and geographic areas to find out the value effect for targets and bidders as well as for each group of mergers. The empirical results showed that bank mergers between partners that focus on both geography and operations increased value more than any other type of mergers. The valuation effects of 558 bank mergers from 1980 to 1997 conducted by Becher (2000) showed that bank mergers increased the stockholder's wealth. Similarly, Joash et al. (2015) collected data from questionnaires about 14 acquiring banks in Kenya and analyzed data using SPSS. The research results showed that M&A activities raised the shareholders' value. Madura and Wiant also investigated the valuation effects of bank acquisitions over time to find out that long-run valuation effects were more favorable for banks that made acquisitions in their current markets and had relatively low pre-acquisition performance and growth rate (Madura & Wiant, 1994).

## 1.3. M&A activities and business results of acquiring banks

The great benefits that M&A can bring to stakeholders have made M&A popular in many countries, especially in emerging ones. However,

there are studies emphasizing a need to evaluate target banks and acquiring banks separately when assessing the impact of M&A in being able to really improve bank performance (Kai & Sim, 2016).

Kai and Sim (2016) used panel data to construct the DEA score to investigate the M&A effects on the efficiency of banks in six emerging countries including China, India, Indonesia and Malaysia. Their research indicated that M&A could increase efficiency for both target banks and acquirer banks, although target banks were the ones that had more benefits. Among the papers on how the effect of M&A on bank performance might differ for targets and acquirers, Goddard et al. (2012) investigated 132 M&As in Asia and Latin America over the period from 1998 to 2009 to find out that on average M&As created shareholder value for target banks, while only geographical diversification created shareholder value for acquirers.

The bank performance can be measured by various indicators depending on the purpose of assessment derived from the perspective of banks, bank customers, banking authorities or the whole economy.

According to Bikker and Bos (2008), bank performance could be expressed in terms of competition, concentration, efficiency, productivity and profitability. Yalcin et al. (2007) divided indicators measuring bank performance into two groups, namely financial criteria and non-financial criteria, when evaluating the performance of the largest five commercial banks in Turkey. According to these authors, financial groups include asset quality, capital adequacy, liquidity, profitability and income and expenditure. Non-financial criteria are pricing, marketing, productivity and delivery services. The methods approached by Yalcin et al. (2007) are Fuzzy Analytical Hierarchy Process (FAHP) and Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS). Taking the same MCDM approach that is increasingly used for evaluating banking performance (Aruldoss et al., 2013), Wua et al. (2009) used the balanced scorecard with four criteria, such as finance, customer, internal process, learning and growth that is developed by Kaplan and Norton (1992). Table 1 summarizes indicators used by different authors to measure bank performance.

**Table 1.** Indicators measuring bank performance

Source: Summarized by authors.

Indicators		Research
Balanced scorecard	Finance	Kaplan and Norton (1992)
	Customer	Kaplan and Norton (1992)
	Internal process	Kaplan and Norton (1992)
	Learning and growth	Kaplan and Norton (1992)
Financial indicators	Asset quality	Yalcin et al. (2007)
	Capital adequacy	Yalcin et al. (2007)
	Liquidity	Yalcin et al. (2007)
	Profitability	Yalcin et al. (2007)
	Income and expenditure	Yalcin et al. (2007)
Non-financial indicators	Pricing	Yalcin et al. (2007)
	Marketing	Yalcin et al. (2007)
	Productivity	Yalcin et al. (2007)
	Delivery services	Yalcin et al. (2007)
Competition		Bikker and Bos (2008)
Concentration		Bikker and Bos (2008)
Efficiency		Bikker and Bos (2008)
Productivity		Bikker and Bos (2008)
Profitability		Bikker and Bos (2008)

Related to financial performance of a bank, European Central Bank (2010) lists Return on Assets (ROA), Return on Equity (ROE) and Net Interest Margin (NIM) as three ratios measuring financial bank performance. To evaluate the financial performance of the bank, Bikker and Bos (2008) used variables such as the ratio of total interest income to total assets, the ratio of annual interest expenses to total funds, the ratio of personnel expenses to total assets, the ratio of other non-interest expenses to fixed assets, the ratio of customer loans to total assets, and the ratio of equity to total assets. Murthy (2004) estimated the important financial ratios of major commercial banks in Oman and showed that the profitability of banks can be assessed by three variables such as return on assets (ROA), return on equity (ROE), and net interest margin (NIM) (Murthy, 2004). Bogdan and Ihnatova (2014) selected 143 commercial banks in five Central and Eastern European countries to identify the banks' profitability over the period from 2004 to 2011 using return on average assets, return on average equity and net interest margin as the performance proxies. Fatima et al. (2014) considered financial banking performance in terms of six ratios such as profit after tax (PAT), return on assets (ROA),



**Table 2.** Indicators measuring financial bank performance and M&A impacts

Source: Summarized by authors.

Indicators	Researches	Impacts of M&A	
		Methods	Conclusion
The ratio of total interest income to total assets (ROA)	Bikker and Bos (2008), Murthy (2004), Bogdan and Ihnatova (2014), Ramadan et al. (2014), Fatima et al. (2014), European Central Bank (2010)	Paired Sample T-Test in SPSS	Not clear (Fatima et al., 2014)
The ratio of annual interest expenses to total funds	Bikker and Bos (2008)		
The ratio of personnel expenses to total assets	Bikker and Bos (2008)		
The ratio of other non-interest expenses to fixed assets	Bikker and Bos (2008)		
The ratio of customer loans to total assets	Bikker and Bos (2008)		
The ratio of equity to total assets	Bikker and Bos (2008)		
The ratio of return on equity (ROE)	Murthy (2004), Bogdan and Ihnatova (2014), Fatima et al. (2014), European Central Bank (2010)	Paired Sample T-Test in SPSS	Clear (Fatima et al., 2014)
The ratio of net interest margin (NIM)	Murthy (2004), Bogdan and Ihnatova (2014), Ramadan et al. (2014), European Central Bank (2010)		
The ratio of debt to equity (D/E)	Fatima et al. (2014)	Paired Sample T-Test in SPSS	Not clear (Fatima et al., 2014)
The ratio of profit after tax (PAT)	Fatima et al. (2014)	Paired Sample T-Test in SPSS	Not clear (Fatima et al., 2014)
The ratio of deposit to equity (DE/E)	Fatima et al. (2014)	Paired Sample T-Test in SPSS	Not clear (Fatima et al., 2014)
The ratio of earnings per share (EPS)	Fatima et al. (2014)	Paired Sample T-Test in SPSS	Not clear (Fatima et al., 2014)

return on equity (ROE), debt to equity ratio (D/E), deposit to equity ratio (DE/E) and earning per share (EPS). By using Sample T-Test in SPSS, they test the changes in six financial ratios due to M&A activities in ten banks in Pakistan. The findings showed that M&A activities had impacts only on ROE. Influences of M&A on other five financial ratios could not be concluded. Table 2 presents indicators used to assess financial bank performance. In addition, it summarizes the results of the previous research related to assessing the impacts of M&A activities on the financial performance of banks.

#### 1.4. M&A activities and effects on reducing operational costs

Finally, M&A can assist banks in reducing operational costs. Davis (2000) noted that after each M&A, on average about 23% of branches as well as 20% to 30% of branch maintenance costs could be saved. However, it was necessary to specify

the number and location of branches that would be closed to ensure the same level of service was maintained without reducing the number of customers (Davis, 2000). The question of determining the number of branches that need to be maintained as well as closed, was known as the delocation problem (Bhaumic, 2010), and was investigated by Miliotis et al. (2002), Wang et al. (2003), ReVelle et al. (2007). Hernández et al. (2015) introduced the new Branch Restructuring Model to solve delocation problem. They tested the model on the basis of a realistic scenario when considering merging three savings banks into a larger financial institution. The empirical results have shown that cutting down about 40% of the branch network after M&A can save more than 45% of annual operating costs from the second year onwards. Therefore, it can be seen that reducing redundant branches after M&A can certainly not only be able to save the bank's operating costs but also can increase the quality of customer service.

**Table 3.** Research results about impacts of M&A on the banking system and acquiring banks

Source: Summarized by authors.

Influenced factors M&A impacts	National financial system	Value/business results/ efficiency of acquiring banks	Cost of acquiring banks
Positive	Koetler (2005) Yildirim et al. (2007) Jagtiani (2008) Poshakwal and Qian (2011) Elikplimi et al. (2012) Elikplimi et al. (2012) Hernández et al. (2015)	Madura and Wiant (1994) Rad and Beek (1999) Becher (2000) Scholtens and Wit (2004) Joah et al. (2015) Kai and Sim (2016)	Davis (2000) Iwanicz-Drozdowska et al. (2016)
Negative	Elikplimi et al. (2012)	–	–
Neutral	Koetler (2008) Bernad et al. (2010)	Koetler (2008) Bernad et al. (2010)	Koetler (2008) Bernad et al. (2010)

Although many studies show that M&As often increase the value or improve the efficiency of banks, according to Bernad et al. (2010), there is not much clear evidence that M&A can reduce the costs, or increase productivity, profitability or market value of banks involved in M&A deals. For example, while assessing the impact of M&A on the productivity of Spanish savings banks, Bernard et al. have indicated that bank productivity improvements could be found only in half of the mergers under the consideration. They also noted that their empirical results were close to those in Koetler's study evaluating the impact of M&A on the German banking system (Koetler, 2008).

All effects of M&A activities on banking system and acquiring banks are described in Table 3.

## 2. METHODOLOGY

### 2.1. Research design

Firstly, the research aims to test if M&A activities have impacts on business results of acquiring banks using Independent Samples T-Test. Based on the above literature review in general and the European Central Bank (2010) data in particular, the study has taken three ratios, including Return on Assets (ROA), Return on Equity (ROE) and Net Interest Margin (NIM), to measure the business results of acquiring bank.

Dividing the net income of the bank by the amount of its assets, ROA shows how well a bank's assets are being used to generate profits.

$$ROA = \frac{Net\ Income}{Assets}. \quad (1)$$

While ROA provides useful information about bank profitability, Return on Equity (ROE) indicates how much the bank is earning on their equity investment. In other words, ROE shows the net income per dollar of equity capital.

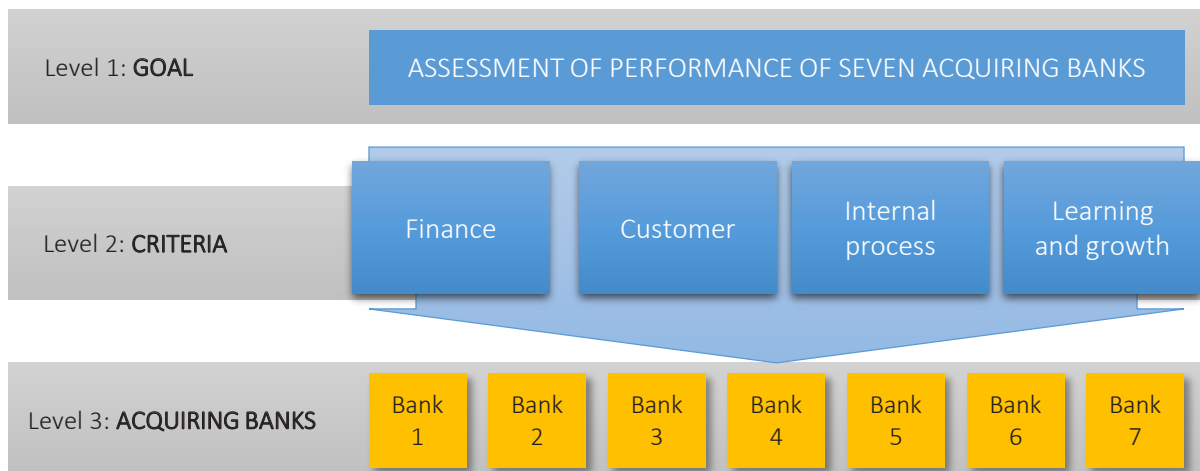
$$ROE = \frac{Net\ Income}{Equity}. \quad (2)$$

Net Interest Margin (NIM) is another commonly reviewed measure of the bank performance. It is the difference between interest income and interest expenses as a percentage of total assets. How well a bank manages its assets and liabilities is affected by the spread between the interest earned on the banks' assets and the interest costs on its liabilities.

$$NIM = \frac{Interest\ Income - Interest\ Expenses}{Assets}. \quad (3)$$

Moreover, the research focuses on evaluating the performance of seven acquiring banks based on Balanced Scorecard developed by Kaplan and Norton (1992) by using a fuzzy TOPSIS approach. The research aims to rank acquiring banks according to their performance. Research model is presented in Figure 1.

Moreover, there is an expert survey distributed to experts including state agency managers and commercial banks' managers. The research is totally based on evaluation of bank performance by Balanced Scorecard that Kaplan and Norton (1992) developed and Wua et al. (2009) mentioned in their research. The survey included 23 questions covering four main contents, such as Finance, Customer, Internal Process and Learning and Growth. There are six indices (Sales, Debt ratios, Return on Assets, Earnings per share, Net profit margin, Return on investment) for the Finance



**Figure 1.** Research model

criterion, six indices (Customer satisfaction, Profit per customer, Market share rate, Customer retention rate, Customer increasing rate, Profit per customer) for Customer criterion, six indices (Number of new service items, Transaction efficiency, Customer complaints, Rationalized forms and processes, Sales performance, Management performance) for the Internal Process criterion and five indices (Responses of customer service, Professional training, Employee stability, Employee satisfaction and Organization competence) for the Learning and Growth Criterion.

In order to make sure the effectiveness of questionnaires, the authors did pilot testing. Questionnaires were distributed to three managers in both commercial banks and state agencies that are located in Hanoi. The principal objective of pilot testing is to ask respondents if they understand the questionnaire, if there are any comments about both contents and format of survey or any suggestions in order to make survey clearer and more significant. Based on the sample group's feedback about how they understand and what they still concern about questions, ... etc., the authors made necessary adjustments and amendments in order to make sure that the question had face validity. To ensure the accuracy of responses, the research used various kinds of questions including closed-ended and open-ended ones, as well as Likert scale questions with a five-point scale from 1 to 5<sup>1</sup> which allows the individual to express how much they agree or disagree with a

particular statement. After that, the authors distributed survey questionnaires to 10 managers in commercial banks and state agencies.

## 2.2. Variables

For the first objective of assessing the impact of M&A on ROA, ROE and NIM of acquiring banks, there are six chosen banks, including SCB, SHB, HBD, MSB, BIDV and STB. The case of PVCombank – merge between a bank (Western Bank) and a finance corporation (PetroVietnam Finance Corporation – PVFC) is not described due to difficulties of collecting financial data of Western Bank before M&A. All three financial ratios such as ROA, ROE and NIM are calculated for all six acquiring banks during three pre-merger years and three post-merger years, based on their audited financial statements during six years.

Data used for evaluating performance of seven acquiring banks were collected through expert questionnaires distributed to ten experts including state agency managers, commercial banks' managers with 20 years of working experience on average for soliciting their professional opinions.

## 2.3. Methods of data analysis

To test if M&A activities have impacts on business results of acquiring banks, the research uses Paired Samples T-Test. In theory, as a parametric

<sup>1</sup> 1: Very dissatisfied; 2: Dissatisfied; 3: Fair; 4: Satisfied; 5: Very satisfied.

test, Paired Samples T-Test compares the means of two independent groups including financial ratios before and after the merger, in order to determine whether there is statistical evidence that the associated population means are significantly different.

There are two hypotheses, including the null hypothesis ( $H_0$ ) and alternative hypothesis ( $H_1$ ).

$H_0$ : M&A activity has no significant effect on business results of acquiring banks.

$$H_0 = \mu_{pre} - \mu_{post} = 0. \quad (4)$$

The difference between the two financial ratio means is equal to 0.

$H_1$ : M&A activity has a significant effect on business results of acquiring banks.

$$H_1 = \mu_{pre} - \mu_{post} \neq 0. \quad (5)$$

The difference between the two financial ratio means is equal to 0, where  $\mu_{pre}$ : financial ratios of acquiring banks before M&A;  $\mu_{post}$ : financial ratios of acquiring banks after M&A.

The research chooses confidence interval Percentage of 95%. This means that the significance level ( $\alpha$ ) chosen is 0.05. This choice of confidence interval percentage does not affect the test statistic or  $\rho_{value}$  or standard error. Since  $\rho_{value} < \alpha$ , one can reject the null hypothesis and conclude that M&A activities have effects on business results of acquiring banks. In contrast, if  $\rho_{value} > \alpha$ , the null hypothesis must be accepted and one should conclude that M&A activities don't have any impact on business results of acquiring banks.

To rank acquiring banks according to their performance, the article uses fuzzy Technique for Order Performance by Similarity to Ideal Solution (fuzzy TOPSIS).

There are:

- $m$  alternatives (Acquiring banks) to assess. Call  $A_i$  with  $i = 1, 2, 3, \dots, m$ ;

- $n$  criteria to assess. Call  $C_j$  with  $j = 1, 2, 3, \dots, n$ ;
- $k$  decision-makers. Call  $D_r$  with  $r = 1, 2, 3, \dots, k$ ;
- fuzzy scale is presented as in Table 4.

**Table 4.** Fuzzy scale used in this research

Linguistic value	Triangular FN ( $\tilde{a}_{ij}$ )
Very dissatisfied	(0; 0.1; 0.3)
Dissatisfied	(0.1; 0.3; 0.5)
Fair	(0.3; 0.5; 0.7)
Satisfied	(0.5; 0.7; 0.9)
Very satisfied	(0.8; 0.9; 1.0)

**Step 1:** Calculate fuzzy rating of the decision maker  $D_r$  about alternative  $A_i$  about criterion  $C_j$ .

There are  $T$  questions for criterion  $C_j$ . So, one can have:

- $\tilde{X}_{ij}^{rt}$  is fuzzy rating of the decision maker  $D_r$  about alternative  $A_i$  about question  $t$  in criterion  $C_j$
- $\tilde{X}_{ij}^{rt} = (a_{ij}^{rt}, b_{ij}^{rt}, c_{ij}^{rt})$
- $\tilde{X}_{ij}^r$  is fuzzy rating of the decision maker  $D_r$  about alternative  $A_i$  about criterion  $C_j$

$$a_{ij}^r = \frac{1}{T} \sum_{t=1}^T a_{ij}^{rt}; b_{ij}^r = \frac{1}{T} \sum_{t=1}^T b_{ij}^{rt}; c_{ij}^r = \frac{1}{T} \sum_{t=1}^T c_{ij}^{rt}. \quad (6)$$

**Step 2:** Calculate the aggregated fuzzy ratings for alternatives. The aggregated fuzzy rating  $\tilde{X}_{ij} = (a_{ij}, b_{ij}, c_{ij})$  of alternative  $A_i$  with criterion  $C_j$  is calculated by formulas:

$$a_{ij} = \min(a_{ij}^r); b_{ij} = \frac{1}{k} \sum_{r=1}^k b_{ij}^r; c_{ij} = \max(c_{ij}^r). \quad (7)$$

**Step 3:** Compute the normalized fuzzy decision matrix  $\tilde{R} = [\tilde{X}_{ij}]$ :

$$\tilde{X}_{ij} = \left( \frac{a_{ij}}{c_j^*}, \frac{b_{ij}}{c_j^*}, \frac{c_{ij}}{c_j^*} \right) \text{ and } c_j^* = \max(c_{ij}). \quad (8)$$



So there is the normalized fuzzy decision matrix:

$$\tilde{X} = \begin{matrix} & \begin{matrix} C_1 & C_2 & \dots & C_{n-1} & C_n \end{matrix} \\ \begin{matrix} A_1 \\ A_2 \\ \dots \\ A_{m-1} \\ A_m \end{matrix} & \left| \begin{matrix} \tilde{X}_{11} & \tilde{X}_{12} & \dots & \tilde{X}_{1n-1} & \tilde{X}_{1n} \\ \tilde{X}_{21} & \tilde{X}_{22} & \dots & \tilde{X}_{2n-1} & \tilde{X}_{2n} \\ \dots & \dots & \dots & \dots & \dots \\ \tilde{X}_{m-11} & \tilde{X}_{m-12} & \dots & \tilde{X}_{m-1n-1} & \tilde{X}_{m-1n} \\ \tilde{X}_{m1} & \tilde{X}_{m2} & \dots & \tilde{X}_{mn-1} & \tilde{X}_{mn} \end{matrix} \right. \end{matrix}$$

**Step 4:** Calculate the aggregated fuzzy weights for criteria.

There is the weight of criteria  $C_j$  evaluated by the decision-maker  $D_r$  ( $W_j^r$ ),

$$\tilde{W}_j^r = (w_{j1}^r, w_{j2}^r, w_{j3}^r).$$

The aggregated fuzzy weight  $\tilde{W}_j$  for the criterion  $C_j$  is computed as follows:

$$\begin{aligned} W_j &= (w_{j1}, w_{j2}, w_{j3}), \\ W_{j1} &= \min(W_{j1}^r); W_{j2} = \\ &= \frac{1}{k} \sum_{r=1}^k W_{j2}^r; W_{j3} = \max(W_{j3}^r). \end{aligned} \tag{9}$$

**Step 5:** Compute the weighted normalized fuzzy decision matrix.

$$\tilde{V} = (\tilde{v}_{ij}), \text{ where } \tilde{v}_{ij} = \tilde{X}_{ij} \times w_j. \tag{10}$$

So there is the weighted normalized fuzzy decision matrix:

$$\tilde{V} = \begin{matrix} & \begin{matrix} C_1 & C_2 & \dots & C_{n-1} & C_n \end{matrix} \\ \begin{matrix} A_1 \\ A_2 \\ \dots \\ A_{m-1} \\ A_m \end{matrix} & \left| \begin{matrix} w_1 x \tilde{X}_{11} & w_2 x \tilde{X}_{12} & \dots & w_{n-1} x \tilde{X}_{1n-1} & w_n x \tilde{X}_{1n} \\ w_1 x \tilde{X}_{21} & w_2 x \tilde{X}_{22} & \dots & w_{n-1} x \tilde{X}_{2n-1} & w_n x \tilde{X}_{2n} \\ \dots & \dots & \dots & \dots & \dots \\ w_1 x \tilde{X}_{m-11} & w_2 x \tilde{X}_{m-12} & \dots & w_{n-1} x \tilde{X}_{m-1n-1} & w_n x \tilde{X}_{m-1n} \\ w_1 x \tilde{X}_{m1} & w_2 x \tilde{X}_{m2} & \dots & w_{n-1} x \tilde{X}_{mn-1} & w_n x \tilde{X}_{mn} \end{matrix} \right. \end{matrix}$$

**Step 6:** Compute the Fuzzy Positive Ideal Solution (FPIS –  $A^+$ ) and Fuzzy Negative Ideal Solution (FNIS –  $A^-$ ).

$$A^+ = (\tilde{v}_1^+, \tilde{v}_2^+, \dots, \tilde{v}_n^+), \text{ where } \tilde{v}_j^+ = \max(v_{ij3}), \tag{11}$$

$$A^- = (\tilde{v}_1^-, \tilde{v}_2^-, \dots, \tilde{v}_n^-), \text{ where } \tilde{v}_j^- = \min(v_{ij1}). \tag{12}$$

**Step 7:** Calculate the distance from each alternative  $A_i$  to the FPIS ( $d_i^+$ ) and to the FNIS ( $d_i^-$ ).

$$d_i^+ = \sum_{j=1}^n d(\tilde{v}_{ij}, \tilde{v}_j^+), \tag{13}$$

$$d_i^- = \sum_{j=1}^n d(\tilde{v}_{ij}, \tilde{v}_j^-). \tag{14}$$

According to Bojadziew et al. (1995), the distance between two triangular fuzzy numbers  $\tilde{x} = (a_1, b_1, c_1)$  and  $\tilde{y} = (a_2, b_2, c_2)$  is calculated as follows:

$$d(\tilde{x}, \tilde{y}) = \sqrt{\frac{1}{3} [(a_1 - a_2)^2 + (b_1 - b_2)^2 + (c_1 - c_2)^2]}. \tag{15}$$

**Step 8:** Calculate the closeness coefficient  $CC_i$  for each alternative  $A_i$ .

$$CC_i = \frac{d_i^-}{d_i^- + d_i^*}. \tag{16}$$

**Step 9:** Rank the acquiring banks in descending order. The highest closeness coefficient represents the best bank.

### 3. EMPIRICAL RESULTS

#### 3.1. M&A activity and its impact on business results of acquiring banks in Vietnam

Table 5 shows the results of Paired Samples T-Test. It is clearly seen that mean value of ROE, ROA and NIM is positive and has decreased after the merger. The Paired Samples Correlation table provides additional information to support that all financial ratios such as ROE, ROA and NIM before and after M&A activities are positively correlated. Correlations between ROE\_pre and ROE\_post, ROA\_pre and ROA\_post are significant with 0.771 and 0.577, respectively, while NIM\_pre and NIM\_post is only 0.106.

Paired Samples Test gives the hypothesis test results. The p-value for ROE and NIM (0.054 and 0.526, respectively) is greater than the significance level of 5%. This means that the after-merger value of ROE and NIM is not influenced by its pre-merger time period. In other words, null hypothesis is accepted for ROE and NIM ratios. However, the p-value for ROA of 0.044 is less than the signifi-

**Table 5.** Results of paired samples T-test

Source: Results extracted from SPSS.

Paired samples statistics					
		Mean, %	N	Std. deviation, %	Std. error mean, %
Pair 1	ROE_Pre	8.8089	6	5.26252	2.14841
	ROE_post	5.1647	6	5.24702	2.14209
Pair 2	ROA_Pre	0.6870	6	0.41680	0.17016
	ROA_post	0.3150	6	0.24010	0.09802
Pair 3	NIM_Pre	2.1724	6	1.03575	0.42285
	NIM_Post	1.8618	6	0.54251	0.22148

Paired samples correlations				
		N	Correlation	Sig.
Pair 1	ROE_Pre & ROE_post	6	.771	.073
Pair 2	ROA_Pre & ROA_post	6	.577	.230
Pair 3	NIM_Pre & NIM_Post	6	.106	.842

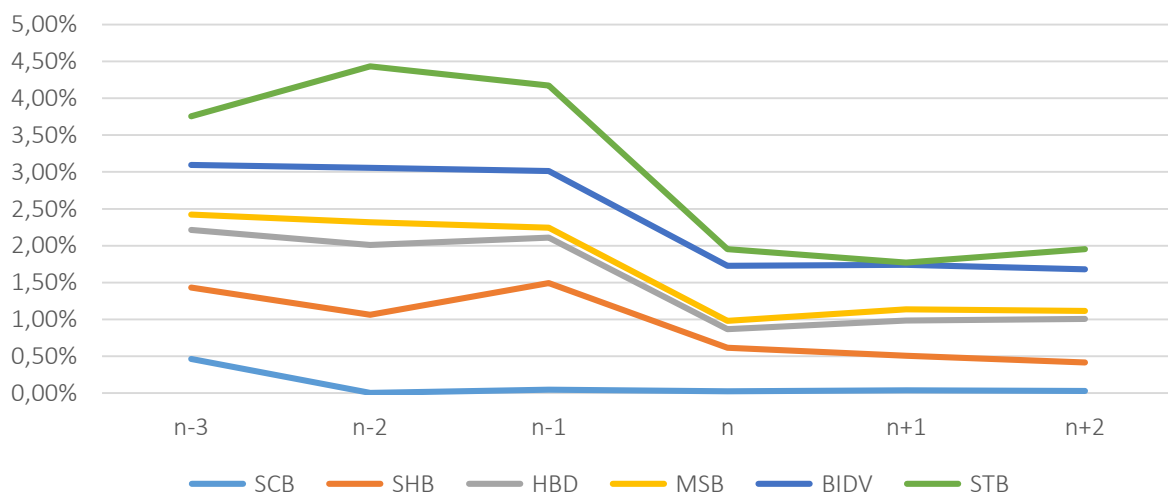
Paired samples test									
		Paired differences					t	df	Sig. (2-tailed)
		Mean, %	Std. deviation, %	Std. error mean, %	95% Confidence interval of the difference, %				
					Lower	Upper			
Pair 1	ROE_Pre – ROE_post	3.64421	3.55576	1.45163	-0.08733	7.37575	2.510	5	.054
Pair 2	ROA_Pre – ROA_post	0.37208	0.34037	0.13896	0.01488	0.72928	2.678	5	.044
Pair 3	NIM_Pre – NIM_Post	0.31063	1.11730	0.45613	-0.86190	1.48316	.681	5	.526

cance level of 5%. This shows that M&A activities have an influence on ROA of acquiring banks. ROA\_pre and ROA\_post are weakly and positively correlated (0.577%). There was a significant average difference between ROA\_pre and ROA\_post (0.37208%). However, it is clearly seen that there is an upward trend in ROA (Figure 2).

In brief, it is not possible to conclude the impact of M&A on ROE and NIM but M&A activities have an effect on ROA but this influence is negative.

### 3.2. Evaluating performance of acquiring banks in Vietnam from 2011 to 2016

Table 6 shows fuzzy weight of BSC performance evaluation index by Fuzzy TOPSIS and indicates the importance of all four criteria such as finance, customer, internal process and learning and growth. According to experts, finance plays the most important role and the two last criteria have the same important role for bank performance.



**Figure 2.** ROA of acquiring banks from three years before and three years after M&A

**Table 6.** Fuzzy weights of BSC performance evaluation index by Fuzzy Topsis

Source: Authors.

Criteria	Local weights
C1_Finance	(0.8; 0.9; 1)
C2_Customer	(0.5; 0.81; 1)
C3_Internal process	(0.5; 0.72; 1)
C4_Learning and Growth	(0.5; 0.72; 1)

**Table 7.** The closeness coefficient for each alternative and the descending order of acquiring banks

Source: Authors.

Alternatives	$A_1$	$A_2$	$A_3$	$A_4$	$A_5$	$A_6$	$A_7$
d <sup>+</sup>	2.3027	2.4579	2.3181	2.5047	2.5072	2.3020	2.2486
d <sup>-</sup>	1.2652	1.2337	1.4078	1.2569	1.2569	1.3390	1.4767
CC	0.3546	0.3342	0.3778	0.3341	0.3339	0.3677	0.3964
Rank	4	5	2	6	7	3	1

Based on the closeness coefficient for each alternative in Table 7, the research classes  $A_7$  in the first place with the biggest CC of 0.3964, while  $A_5$  has the smallest CC of 0.0339. Next to  $A_7$ , it is  $A_3$  with CC of 0.3778 and  $A_6$  with CC of 0.3677.

## CONCLUSION

Through empirical results analyzed above, it is clearly seen that seven successful M&A deals between commercial banks are quite efficient and create slightly synergy effect on acquiring banks. M&A activities don't influence ROE and NIM of acquiring banks in Vietnam. Although there is an impact of M&A activities on ROA of acquiring banks in Vietnam, this effect is negative, however. In other words, the acquiring banks have not seen much positive changes in business results. These empirical results are totally inverse with Fatima et al. (2014) when they conclude that M&A activities have an impact on ROE, while the influence on ROA is not clear.

In addition, except for  $A_7$ 's M&A activity that is not based on the market price because it is implemented by the state that holds over 90% of its charter capital, the acquiring banks, including  $A_3$  and  $A_6$ , actively participate in M&A. This is because of its real demand on increasing equity, creating a large and healthy banks that are well suited for the development of the economy as well as being able to operate in the international market. Their M&A activities are totally based on interests of both acquiring and target banks. The other banks are obligated of merging or being merged because of their weakness. However, these acquiring banks still cannot improve their performance.

In brief, during the 2011–2016 period, M&A activities in banking system of Vietnam is not in-depth. M&A activities only make acquiring banks bigger in terms of charter capital, total assets, profit after tax, number of transaction offices and number of employees, while their performance has not been improved much. This result justifies that M&A was not a good method for dealing with weak banks in Vietnam in the past time. Therefore, in the next time period, to deal with big problems like non-performance loans or weak banks, Vietnam should focus on the other market solutions such as securitization and improve the efficiency of M&A activities at the same time.

## ACKNOWLEDGEMENT

We would like to thank Vietnam National University, Hanoi (VNU), for financing the Research Project number QG.18.25 “Securitization of banking bad debt: International experiences and lessons for Vietnam”. This paper has been extracted from this research.

## REFERENCES

1. Aruldoss, M., Lakshmi, T. M., & Venkatesan, V. P. (2013). A survey on multi criteria decision making methods and its applications. *American Journal of Information systems*.
2. Baera, W., & Nazmi, N. (2000). Privatization and restructuring of banks in Brazil. *The Quarterly Review of Economics and Finance*, 40, 3-24.
3. Becher, D. (2000). The valuation effects of bank mergers. *Journal of Corporate Finance*, 6, 189-214.
4. Bernad, C., Fuentelsaz, L., & Gomez, J. (2010). The effect of mergers and acquisitions on productivity: An empirical application to Spanish banking. *Omega*, 38, 283-293.
5. Bhaumik, P. (2010). Optimal shrinking of the distribution chain: the facilities delocation decision. *International Journal of Systems Science*, 41(3), 271-280.
6. Bikker, J. A., & Bos, J. W. (2008). *Bank Performance: A Theoretical and Empirical Framework for the Analysis of Profitability, Competition and Efficiency*. New York: Routledge.
7. Bogdan, C., & Ilnatova, J. (2014). Banks' Profitability in Selected Central and Eastern European Countries. *Procedia Economics and Finance*, 16, 587-591.
8. Bojadziev, G., & Bojadziev, M. (1995). Fuzzy sets, fuzzy logic, applications, *Advances in Fuzzy Systems. Applications and Theory*.
9. Bou-Said, M. J., & Saucier, P. (2003). Liquidity, solvency, and efficiency? An empirical analysis of the Japanese banks' distress. *University of Birmingham 20th Symposium on Banking and Monetary Economics. June 5-6*. Birmingham: University of Birmingham.
10. Davis, S. (2000). *Bank mergers. Lessons for the future*. Wiltshire: Palgrave Macmillan.
11. DeLong, G. (2001). Stockholder gains from focusing versus diversifying bank mergers. *Journal of Financial Economics*, 59, 221-252.
12. DeLong, G. (2003). The announcement effects of US versus non-US bank mergers: do they differ? *Journal of Financial Research*, 26, 487-500.
13. Elikplimi, K., Abor, J., & Adjasi, C. (2012). Domestic banking sector development and cross border mergers and acquisitions in Africa. *Review of Development Finance*, 2, 32-42.
14. European Central Bank. (2010). *EU Banking Structures*. European Central Bank. Eurosystem.
15. Fatima, T., & Shehzad, A. (2014). An analysis of Impact of Merger and Acquisition of Financial Performance of Banks. A case of Pakistan. *Journal of Poverty, Investment and Development*.
16. Focarelli, D., & Ponzillo, A. F. (2001). The patterns of cross-border bank mergers and shresholdings of OECD. *Journal of Banking & Finance*, 25, 2305-2337.
17. Focarelli, D., Panetta, F., & Salleo, C. (2002). Why do banks merge? *Journal of Money, Credit and Banking*, 34(4), 1047-1066. <http://dx.doi.org/10.1353/mcb.2002.0054>
18. Goddard, J., Molyneux, P., & Zhou, T. (2012). Bank mergers and acquisitions in emerging markets: evidence from Asia and Latin America. *European Journal of Finance*, 18(5), 419-438.
19. Hernández, S. M., Gill, E. G., & Renart, M. A. (2015). Spanish credit institutions: do efficiency and solvency support the first decisions on bank restructuring from a financial point of view 2008–2012? *Contaduría y Administración*, 60, 367-388.
20. Iwanicz-Drozowska, M., Smaga, P., & Witkowski, B. (2016). Bank restructuring in the EU: Which way to go? *Journal of Policy Modeling*, 38, 572-586.
21. Jagtiani, J. (2008). Understanding the effects of the merger boom on community banks. *Economic Review*, 93(3), 28-48.
22. Joash, G. O., & Njangira, M. J. (2015). The Effect of Mergers and Acquisitions on Financial Performance of Banks (A Survey of Commercial Banks in Kenya). *International Journal of Innovative Research & Development*, 101-113.
23. Kai, D., & Sim, N. (2016). Mergers, acquisitions, and bank efficiency: Cross-country evidence from emerging markets. *Research in International Business and Finance*, 36, 499-510. <https://doi.org/10.1016/j.ribaf.2015.10.005>
24. Kaplan, R. S., & Norton, D. P. (1992). The Balanced Scorecard: Measures that Drive Performance. *Harvard Business Review*, 70(1), 71-79. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/10119714>
25. Koetler, M. (2005). *Evaluating the German Bank Merger Wave* (Discussion Paper Series 2: Banking and Financial Studies No. 12/2005). Frankfurt am Main: Deutsche Bundesbank. Retrieved from <https://www.bundesbank.de/resource/blob/704188/52e1243936f242aa34ec915f96358a85/mL/2005-11-23-dkp-12-data.pdf>

26. Koetler, M. (2008). An assessment of bank merger success in Germany. *German Economic Review*, 9(2), 232-264.
27. Madura, J., & Wiant, K. (1994). Long-term valuation effects of bank acquisitions. *Journal of Banking & Finance*, 18, 1135-1154. Retrieved from <https://kundoc.com/pdf-long-term-valuation-effects-of-bank-acquisitions-.html>
28. Miliotis, P., Dimopoulou, M., & Giannikos, I. (2002). A hierarchical location model for locating bank branches in a competitive environment. *International Transactions in Operational Research*, 9(5), 549-565.
29. Murthy, Y. (2004). *A study on Financial Ratios of Major Commercial Banks*. <http://dx.doi.org/10.2139/ssrn.1015238>
30. Poshakwale, S. S., & Qian, B. (2011). Competitiveness and efficiency of the banking sector and economic growth in Egypt. *African Development Review*, 23(1), 99-120.
31. Rad, A., & Beek, L. V. (1999). Market Valuation of European Bank Mergers. *European Management Journal*, 17(5), 532-540.
32. Ramadan, I. Z., Kilani, Q. A., & Kaddumi, T. A. (2011). Determinants of bank profitability: Evidence from Jordan. *International Journal of Academic Research*, 3(4), 180-191. Retrieved from [https://www.researchgate.net/publication/286143663\\_Determinants\\_of\\_bank\\_profitability\\_Evidence\\_from\\_Jordan](https://www.researchgate.net/publication/286143663_Determinants_of_bank_profitability_Evidence_from_Jordan)
33. ReVelle, C., Murray, A., & Serra, D. (2007). Location models for ceding market share and shrinking services. *Omega*, 35(5), 533-540. <https://doi.org/10.1016/j.omega.2005.10.001>
34. Reztis, A. (2008). Efficiency and productivity effects of bank mergers: Evidence from the Greek banking industry. *Economic Modelling*, 25(2), 236-254. <https://doi.org/10.1016/j.econmod.2007.04.013>
35. Scholtens, B., & de Wit, R. (2004). Announcement effects of bank mergers in Europe and the US. *Research in International Business and Finance*, 18(2), 217-228. <https://doi.org/10.1016/j.ribaf.2004.04.002>
36. Wang, Q., Batta, R., Bhadury, J., & Rump, C. (2003). Budget constrained location problem with opening and closing of facilities. *Computers & Operations Research*, 30(13), 2047-2069. [https://doi.org/10.1016/S0305-0548\(02\)00123-5](https://doi.org/10.1016/S0305-0548(02)00123-5)
37. Wua, H.-Y., Tzeng, G.-H., & Chen, Y.-H. (2011). A fuzzy MCDM approach for evaluating banking performance based on Balanced scorecard. *Expert Systems with Applications*, 36(6), 10135-10147. <https://doi.org/10.1016/j.eswa.2009.01.005>
38. Yalcin, N., Bayrakdaroglu, A., & Kahraman, C. (2007). Fuzzy performance evaluation in Turkish Banking Sector using Analytic Hierachy Process and TOPSIS. *Expert Systems with Application*, 36(9), 11699-11709. <http://dx.doi.org/10.1016/j.eswa.2009.03.013>
39. Yildirim, H. S., & Philippatos, G. C. (2007). Restructuring, consolidation and competition in Latin American banking markets. *Journal of Banking & Finance*, 31(3), 629-639.



## APPENDIX A

Table A1. M&amp;A deals in Vietnam from 2011 to 2016

Source: Authors.

No.	Date approved	Banks	Bank after M&A	Reasons for M&A decision-making
1	2012	Sai Gon Commercial Bank (SCB) First Joint Stock Commercial Bank (Ficombank) Vietnam TinNghia Bank (TinNghiaBank)	Sai Gon Commercial Bank (SCB)	<p>The main reason for the 3 banks suffering from liquidity is that they use short-term capital to provide medium and long-term loans mostly in the real estate sector. When short-term funds are no longer abundant, those banks have lost their ability to make a temporary payment.</p> <p>Three banks voluntarily merged with each other under the auspices of the Bank for Investment and Development of Vietnam (BIDV) and the State Bank of Vietnam (SBV) through a refinancing loan.</p> <p>A new bank formed after the merger process will receive and exercise the owner's rights over the entire assets as well as be responsible for all the debts of the three consolidated banks. The book value of the three consolidated banks will be transferred to the new bank on the merger date and the chartered capital of the new bank will equal the total chartered capital of the three merged banks.</p>
2	2012	Hanoi Building Commercial Bank (Habubank) Saigon Hanoi Bank (SHB)	Saigon Hanoi Bank (SHB)	<p>In the case of Habubank, the loans and bond investment associated with Vietnam Shipbuilding Industry Group (Vinashin) were identified as the biggest burden, leading to difficulties for the bank to consider the merger plan. Habubank's bad debt ratio before the merger is 23.66% or VND 3,729 billion.</p> <p>According to the merger agreement, one share of Habubank was converted into 0.75 SHB shares after the merger, and one SHB share before the merger was valued at 1.21 SHB shares after the merger.</p>
3	2013	Western Bank PetroVietnam Finance Corporation (PVFC)	Vietnam Public Joint Stock Commercial Bank (PVcom Bank)	<p>Managing and controlling risk is a big problem for Western Bank. In addition, the bank provided a very large amount of credit to backyard businesses as well as internal shareholders, which led to many risks for the bank.</p> <p>Western Bank has been merged with PetroVietnam Finance Corporation (PVFC) within a mandatory restructuring process. The consolidation method in this deal is to add the value of assets, liabilities and equity of PVFC and Westernbank together to become the value of assets, liabilities and equity of the newly merged commercial bank.</p>
4	2013	Dai A Bank DBank	HDBank	<p>Although not considered a weak bank, the high official bad debt rate has put pressure on Dai A bank to restructure. On June 15, 2013, the second shareholder meeting of Dai A Bank has approved the plan to merge this bank into HDBank with a conversion ratio of 1:1.</p>
5	2015	MDBank Maritime Bank	Maritime Bank	<p>According to the Mekong Bank's 2012 Annual Report, Maritime Bank is the largest shareholder in MDB with a holding of 10.16%. By the end of 2013, Maritime Bank and Maritime Bank Asset Management Co., Ltd. have invested more than VND 760 billion in Tin Phat Fund Management JSC (TPF), of which VND 282 billion invested in MDB. On March 18, 2015, Mekong Bank (MIB) was merged into Maritime Bank of Vietnam.</p>
6	2015	MHBank BIDV	BIDV	<p>Official MHB bad debt ratio increased from 1.94% in FY2010 to 2.99% in FY2012. After VAMC was established and officially put into operation, in FY2014 MHB transferred VND 1,037 billions of bad loans to this organization.</p> <p>The merger between MHBank and BIDV is not based on the market price because it is implemented by the State and the State holds over 90% of charter capital. The swap ratio is 1:1. In addition, BIDV will issue additional 336.9 million shares in exchange for the entire shares of MHB. BIDV will be responsible for all MHB's rights, obligations, assets, liabilities and equity.</p>
7	2015	Southern Bank Sacombank	Sacombank	<p>This is a voluntary merger transaction aimed at creating a large, healthy bank that is well suited for the development of the economy as well as being able to operate in the international market.</p>

## APPENDIX B

**Table B1.** List of commercial banks in Vietnam in 2016

Source: State Bank of Vietnam.

No	Bank	Abbreviation	Code
1	An Binh Commercial Joint Stock Bank	AnBinh Bank	ABB
2	Asia Commercial Joint Stock Bank	ACB	ACB
3	Bac A Commercial Joint Stock Bank	Bac A Bank	NAS
4	Bao Viet Joint Stock commercial Bank	BaoViet Bank	BVB
5	Construction Commercial One Member Limited Liability Bank	CB Bank	CB
6	Dong A Commercial Joint Stock Bank	Dong A Bank	EAB
7	Global Petro Sole Member Limited Commercial Bank	GP Bank	GPB
8	Ho Chi Minh city Development Joint Stock Commercial Bank	HDBank	HDB
9	Joint Stock Commercial Bank for Foreign Trade of Vietnam	Vietcombank	VCB
10	Joint Stock Commercial Bank for Investment and Development of Vietnam	BIDV	BIDV
11	Kien Long Commercial Joint Stock Bank	Kien Long Bank	KLB
12	LienViet Commercial Joint Stock Bank	Lienviet Post Bank	LPB
13	Military Commercial Joint Stock Bank	MB	MBB
14	Nam A Commercial Joint Stock Bank	Nam A Bank	NAB
15	National Citizen bank	NVB	NCB
16	Ocean Commercial One Member Limited Liability Bank	OceanBank	OJB
17	Orient Commercial Joint Stock Bank	Orient Bank	OCB
18	Petrolimex Group Commercial Joint Stock Bank	PGBank	PGB
19	Public Vietnam Bank	PVcomBank	PVCB
20	Sai Gon Commercial Joint Stock Bank	SCB	SCB
21	Saigon Bank for Industry & Trade	Saigonbank	SGB
22	Saigon Thuong TinCommercial Joint Stock Bank	Sacombank	STB
23	Saigon-Hanoi Commercial Joint Stock Bank	SHB	SHB
24	Southeast Asia Commercial Joint Stock Bank	Seabank	SEAB
25	The Maritime Commercial Joint Stock Bank	MSBank	MSB
26	TienPhong Commercial Joint Stock Bank	TPBank	TPB
27	Viet A Commercial Joint Stock Bank	Viet A Bank	VAB
28	Viet Capital Commercial Joint Stock Bank	Viet Capital Bank	VCAP
29	Viet nam Export Import Commercial Joint Stock	Eximbank	EIB
30	Viet Nam Technological and Commercial Joint Stock Bank	Techcombank	TCB
31	Viet Nam Thuong Tin Commercial Joint Stock Bank	Vietbank	VTB
32	Vietnam Bank for Agriculture and Rural Development	Agribank	AGRB
33	Vietnam Commercial Joint Stock Bank for Private Enterprise	VPBank	VPB
34	Vietnam International Commercial Joint Stock Bank	VIB	VIB
35	Vietnam Joint Stock Commercial Bank of Industry and Trade	Vietin Bank	CTG

## APPENDIX C

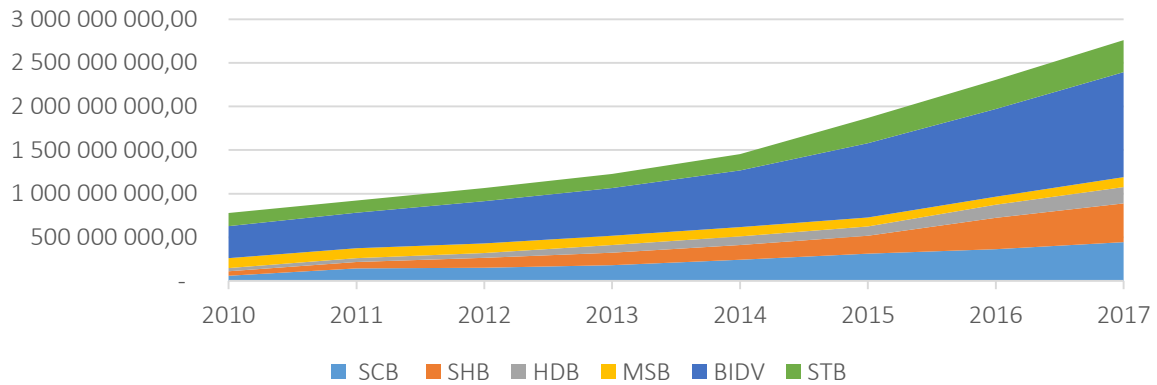
**Table C1.** Charter capital, total assets, number of branches, number of offices and number of employees in acquiring banks from 2010 to 2017

Source: Annual reports of concerned banks.

SCB_2012	2010	2011	2012	2013	2014	2015	2016	2017
Charter capital (million VND)	4,192,998	10,592,049	10,592,049	12,294,801	12,294,801	14,294,801	–	–
Total assets (million VND)	60,182,876	144,814,138	149,205,560	181,018,602	242,222,058	311,513,679	361,682,374	444,031,748
Number of branches	31	31	31	49	49	50	–	–
Number of offices	83	83	83	122	122	179	–	–
Number of employees	1,982	1,982	1,982	3,233	3,315	4,595	–	–
SHB_2012	2010	2011	2012	2013	2014	2015	2016	2017
Charter capital (million VND)	3,590,259	4,908,535	8,962,251	8,865,795	8,865,795	9,485,945		
Total assets (million VND)	51,032,861	70,989,542	116,537,614	143,625,803	169,035,546	204,704,140	361,682,374	444,031,748
Number of branches	18	23	48	54	52	53	–	–
Number of offices	–	–	168	177	241	179	–	–
Number of employees	2,022	2,861	4,996	5,002	5,553	6,083	–	–
HDB_2013	2010	2011	2012	2013	2014	2015	2016	2017
Charter capital (million VND)	2,004,043	3,004,043	5,004,043	8,100,000	8,100,000	8,100,000	–	–
Total assets (million VND)	34,389,227	45,025,421	52,782,831	86,226,641	99,524,600	106,485,935	150,294,272	189,334,271
Number of branches	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Number of offices	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Number of employees	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MSB_2015	2010	2011	2012	2013	2014	2015	2016	2017
Charter capital (million VND)	5,000,000	8,000,000	8,000,000	8,000,000	8,000,000	11,750,000	11,750,000	11,750,000
Total assets (million VND)	115,336,083	114,374,998	109,923,376	107,114,882	104,368,741	104,311,276	92,605,862	112,238,978
Number of branches	27	43	–	44	–	62	–	–
Number of offices	121	157	–	145	–	208	–	–
Number of employees	2,587	4,699	–	–	2,923	3,268	–	–
BIDV_2015	2010	2011	2012	2013	2014	2015	2016	2017
Charter capital (million VND)	16,559,859	15,061,920	23,011,705	28,112,026	28,112,026	34,187,153	–	–
Total assets (million VND)	366,267,769	405,755,454	484,784,560	548,386,083	650,340,373	850,669,649	1,006,377,748	1,202,283,843
Number of branches	113	116	117	127	136	182	–	–
Number of offices	349	376	432	503	595	799	–	–
Number of employees	16,112	17,169	18,215	18,231	19,130	23,854	–	–
STB_2015	2010	2011	2012	2013	2014	2015	2016	2017
Charter capital (million VND)	10,930,982	10,961,760	10,905,440	12,425,116	12,425,116			
Total assets (million VND)	152,386,936	141,468,717	152,118,525	161,377,613	189,802,627	292,032,736	332,023,043	368,468,840
Number of branches	69	72	72	–	72	–	–	–
Number of offices	296	334	337	–	346	–	–	–
Number of employees	8,354	9,596	10,310	–	11,753	–	–	–

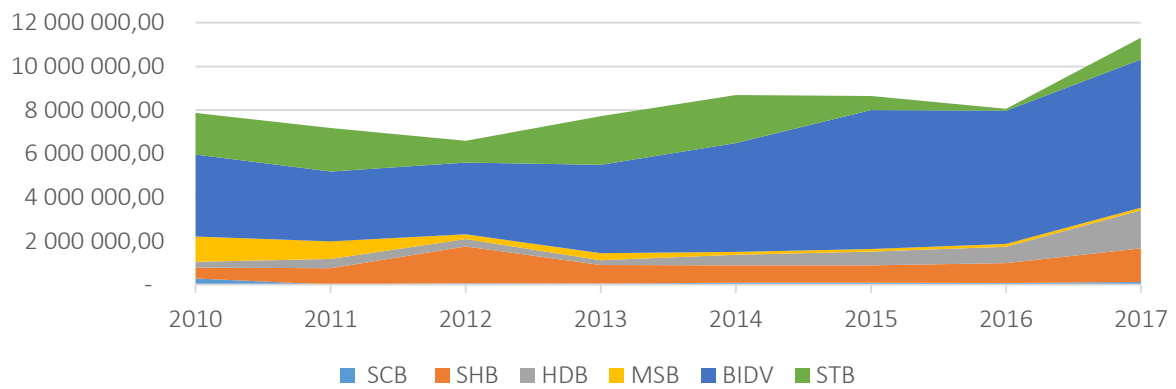
## APPENDIX D

Source: Authors.



**Figure D1.** Total assets of six acquiring banks from 2010 to 2017 (million VND)

Source: Authors.



**Figure D2.** Profit after tax of six acquiring banks from 2010 to 2017 (million VND)

**Table D1.** The weighted normalized fuzzy decision matrix

Source: Authors.

	$A_1$	$A_2$	$A_3$	$A_4$	$A_5$	$A_6$	$A_7$
$C_1$	(0.21; 0.49; 0.81)	(0.10; 0.41; 0.74)	(0.18; 0.54; 0.89)	(0.10; 0.41; 0.74)	(0.08; 0.41; 0.79)	(0.18; 0.51; 0.91)	(0.24; 0.59; 1)
$C_2$	(0.18; 0.50; 0.88)	(0.15; 0.46; 0.84)	(0.13; 0.50; 0.93)	(0.15; 0.46; 0.84)	(0.11; 0.43; 0.84)	(0.16; 0.52; 0.91)	(0.13; 0.55; 0.98)
$C_3$	(0.11; 0.43; 0.89)	(0.10; 0.38; 0.84)	(0.13; 0.44; 0.94)	(0.08; 0.38; 0.84)	(0.08; 0.35; 0.91)	(0.13; 0.44; 0.88)	(0.11; 0.46; 0.93)
$C_4$	(0.13; 0.44; 0.91)	(0.13; 0.39; 0.91)	(0.11; 0.43; 0.95)	(0.07; 0.37; 0.91)	(0.13; 0.39; 0.91)	(0.12; 0.42; 0.91)	(0.11; 0.47; 0.93)

## APPENDIX E

**Table E1.** Fuzzy Positive Ideal Solution (FPIS –  $A^+$ ) and Fuzzy Negative Ideal Solution (FNIS –  $A^-$ )

Source: Authors.

A+	1.0000	0.9831	0.9492	0.9559
A-	0.4140	0.4377	0.3563	0.3705

**Table E2.** The distance from each alternative  $A_i$  to the FPIS (and to the FNIS)

Source: Authors.

	$A_1$	$A_2$	$A_3$	$A_4$	$A_5$	$A_6$	$A_7$
d <sup>+</sup>	2.3027	2.4579	2.3181	2.5047	2.5072	2.3020	2.2486
d <sup>-</sup>	1.2652	1.2337	1.4078	1.2569	1.3150	1.3390	1.4767